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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/826,676

04/05/2001

Jin-Wen Tzeng

P-1026

3516

7590

01/11/2005

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EXAMINER

OWENS, DOUGLAS W

ART UNIT

PAPER NUMBER

2811

DATE MAILED: 01/11/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

**Office Action Summary**

Application No.

09/826,676

Applicant(s)

TZENG ET AL.

Examiner

Douglas W. Owens

Art Unit

2811

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 14 January 2004.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-23 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-23 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                                   | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152)             |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## **DETAILED ACTION**

### ***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 14, 2004 has been entered.

### ***Claim Objections***

2. Claim 22 is objected to because of the following informalities: The term "...said one major..." should be replaced with --said second major--. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claims 10, 13 and 23 are rejected under 35 U.S.C. 102(b) as being anticipated by US patent No. 3,404,061 to Shane et al.

Shane et al. teaches a process for producing a thermal interface (Col. 13, lines 19 – 21) having protective coating (Col. 14, lines 24 – 30, for example) that would have been sufficient to inhibit flaking of graphite particles (See also, Col. 1, lines 43 – 47), the process comprising:

forming a flexible graphite sheet , the sheet comprising expanded and compressed natural graphite particles (Col. 1, lines 25 – 28; Col. 4, lines 7 – 24), into the size and shape desired (Col. 13, lines 49 – 52), wherein the formed flexible graphic sheet has at least one major surface and at least one edge surface, and wherein the sheet has its directions of greater thermal conductivity parallel to the major surface (Col. 13, lines 10 – 23); and

coating the formed flexible graphite sheet with a material to form a protective coating, such that the material forms a protective boundary about the flexible graphite sheet (Col. 1, lines 43 – 47).

Regarding claim 13, Shane et al. teaches a process, wherein the material is coated on the formed graphite sheet on at least one of its major surfaces.

Regarding claim 23, Shane et al. teaches a process, wherein the graphite sheet comprises two major surfaces and one of the major surfaces is not coated.

5. Claims 1, 21 and 22 are rejected under 35 U.S.C. 102(e) as being anticipated by US patent No. 6,262,893 to Liu.

Regarding claim 1, Liu teaches an isolated thermal interface (Fig. 1, (22)) comprising a flexible graphite sheet including particles of natural graphite (Col. 2, lines 50 – 55; Grafoil is known to include particles of natural graphite), at least one of the major surfaces coated with a protective coating sufficient to inhibit flaking of the

particles of graphite (Col. 2, lines 62 – 64; The adhesive would have prevented flaking; Also, see Shane et al., where it is disclosed that Grafoil is coated on at least one major surface).

Regarding claims 21 and 22, Liu teaches a thermal interface, wherein one major surface is not coated with a protective coating (Col. 2, lines 62 – 64) and the major surface is aligned facing and in contact with an electrical component (20).

### ***Claim Rejections - 35 USC § 103***

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 1-5 and 7-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over US patent No. 6,075,287 to Ingraham et al.

Regarding claim 1, Ingraham et al. teaches an isolated thermal interface (12, 12a) comprising a flexible (resilient) graphite sheet (Col. 6, lines 12-25) including particles of graphite and having two major surfaces, at least one surface coated with a protective coating (16) that would have inhibited flaking of the particles of graphite. Ingraham et al. does not explicitly teach that the flexible graphite sheet comprises natural graphite. It would have been obvious to one of ordinary skill in the art to use a known material, such as GRAFOIL®, since it is well suited for the intended use. GRAFOIL®, an expanded and compressed natural graphite, manufactured by Graftech, a subsidiary of Union Carbide, is well known for its desirable thermal properties and use in electronics as heat sinks and thermal interfaces. See related US patent 3,404,061 to Shane et al.

The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Regarding claim 2, Ingraham et al. teaches a thermal interface wherein the protective coating comprises a thermoplastic material (Col 5, lines 24-35).

Regarding claim 3, Ingraham et al. teaches a thermal interface, wherein the thermoplastic material comprises a polyimide.

Regarding claims 4 and 9, Ingraham et al. does not explicitly teach a protective coating that is no more than 0.025 millimeters or 0.015 millimeters in thickness. Ingraham et al. is silent with respect to the thickness of the protective coating. One having ordinary skill in the art would have been required to arrive at the optimal thickness of the protective coating through routine experimentation. Additionally, it has been held that optimization of a result effective variable is within the purview of one having ordinary skill in the art.

Regarding claim 5, Ingraham et al. teaches a thermal interface, wherein the protective coating is sufficient to electrically isolate the coated major surface of the flexible graphite sheet (Col. 5, lines 24-28).

Regarding claim 7, Ingraham et al. teaches a thermal interface, further comprising a layer of adhesive interposed between the protective coating and flexible graphite sheet (Col. 5, lines 30-35).

Regarding claim 8, Ingraham et al. does not teach a thermal interface, wherein the adhesive is selected from the group consisting of acrylic and latex materials. It

would have been obvious to one of ordinary skill in the art to select acrylic or latex since they are known materials that are well suited for the intended use.

8. Claim 6 is rejected under 35 U.S.C. 103(a) as being unpatentable over Ingraham et al. as applied to claims 1-5 above, and further in view of US patent No. 5,834,337 to Unger et al.

Ingraham et al. does not teach a thermal interface, wherein the graphite sheet has edge surfaces that are coated with a protective coating to inhibit flaking. Unger et al. teaches a thermal interface, wherein edges of the graphite interface are coated with a protective coating (Col. 4, lines 13-19). It would have been obvious to one of ordinary skill in the art to incorporate the teaching of Unger et al. into the device taught by Ingraham et al. since it is desirable to prevent graphite particles from contaminating undesired areas of the device.

9. Claims 10-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Ingraham et al. in view of Unger et al.

Regarding claims 10, 11 and 13, Ingraham et al. teaches a process for producing a thermal interface having a protective coating (16) sufficient to inhibit flaking of graphite, the process comprising:

forming a flexible graphite sheet into the size a shape desired for a thermal interface;

wherein the flexible graphite sheet has at least one major surface and at least one edge surface; and

coating the major surfaces with material to form a protective coating.

Ingraham et al. does not teach that the material forms a protective boundary about the flexible graphite sheet. Unger et al. teaches a thermal interface, wherein edges of the graphite interface are coated with a protective coating (Col. 4, lines 13-19) such that the protective boundary is formed about the thermal interface. It would have been obvious to one of ordinary skill in the art to incorporate the teaching of Unger et al. into the device taught by Ingraham et al. since it is desirable to prevent graphite particles from contaminating undesired areas of the device.

Ingraham et al. does not explicitly teach that the graphite sheet has its direction of greater thermal conductivity parallel to the major surface. Ingraham et al. teaches a resilient graphite sheet that has excellent thermal properties. It would have been obvious to one of ordinary skill in the art to select known resilient graphite sheet, such as an expanded graphite sheet produced by Union Carbide sold under the trade name of GRAFOIL®, since it is well suited for the intended use. GRAFOIL® is known to have greater thermal conductivity in a direction parallel to the major surface (See Col. 13, lines 10-23 of Shane et al.). The selection of a known material based on its suitability for its intended use supported a *prima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945).

Ingraham et al. does not teach that the graphite sheet comprises expanded and compressed natural graphite particles. It would have been obvious to one of ordinary skill in the art to select GRAFOIL for the graphite sheet, as explained above. It is known in the art that GRAFOIL comprises expanded and compressed natural graphite particles.



Regarding claim 12, neither Ingraham et al. nor Unger et al. teach coating the graphite sheet by spray coating, roller coating or hot laminating press. The cited references are silent with respect to how the protective coating is applied, so one having ordinary skill in the art would have been required to select a known method of applying the protective coating. It would have been obvious to one of ordinary skill select spray coating, roller coating or hot laminating press since these are known methods of applying a protective coating.

Regarding claim 14, Ingraham et al. teaches a process, wherein the material is coated on the flexible graphite sheet by laminating with adhesive (Col. 5, lines 30-35). Neither Ingraham et al. nor Unger et al. explicitly teach cutting the flexible graphite sheet after coating the sheet with laminate. It would have been obvious to one of ordinary skill to cut the flexible graphite sheet into the desired shape and size, since it is desirable for the graphite to fit properly in the device. It would have further been obvious to coat the flexible graphite sheet either before or after cutting, since it has been held that choosing an order of processing steps only involves routine skill in the art (See *Ex parte Rubin*, 128 USPQ 440).

Regarding claim 15, Ingraham et al. teaches a process, wherein the material comprises a thermoplastic material.

Regarding claim 16, Ingraham et al. teaches a process, wherein the material comprises a polyimide.

Regarding claims 17 and 20, Ingraham et al. does not teach a process wherein the protective coating that is no more than 0.025 millimeters or 0.015 millimeters in thickness. Ingraham et al. is silent with respect to the thickness of the protective

coating. One having ordinary skill in the art would have been required to arrive at the optimal thickness of the protective coating through routine experimentation.

Additionally, it has been held that optimization of a result effective variable is within the purview of one having ordinary skill in the art.

Regarding claim 18, Ingraham et al. teaches a process, further comprising a layer of adhesive interposed between the protective coating and flexible graphite sheet (Col. 5, lines 30-35).

Regarding claim 19, Ingraham et al. does not teach a process, wherein the adhesive is selected from the group consisting of acrylic and latex materials. It would have been obvious to one of ordinary skill in the art to select acrylic or latex since they are known materials that are well suited for the intended use.

### ***Response to Arguments***

10. Applicant's arguments filed July 17, 2003 have been fully considered but they are not persuasive.

Applicant argues that the cited references are only drawn to adhesive coating, as opposed to the protective coating of the claimed invention. This argument is not convincing since Ingraham et al. teach a protective coating that is identical to the material claimed in the instant application. Additionally, Shane et al. teach that protective coatings may be applied to the GRAFOIL, in addition to the adhesive coatings (Col. 14, lines 31 – 35, for example). Coatings applied for the purpose of adding reflectivity, additional strength and particularly wear and oxidation resistance are indeed protective coatings that would have been sufficient to prevent flaking.

### ***Conclusion***

11. All claims are drawn to the same invention claimed in the application prior to the entry of the submission under 37 CFR 1.114 and could have been finally rejected on the grounds and art of record in the next Office action if they had been entered in the application prior to entry under 37 CFR 1.114. Accordingly, **THIS ACTION IS MADE FINAL** even though it is a first action after the filing of a request for continued examination and the submission under 37 CFR 1.114. See MPEP § 706.07(b). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).


A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Douglas W. Owens whose telephone number is 571-272-1662. The examiner can normally be reached on Monday-Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Eddie C. Lee can be reached on 571-272-1732. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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